



# UNITED STATES PATENT AND TRADEMARK OFFICE

*ms*

UNITED STATES DEPARTMENT OF COMMERCE  
United States Patent and Trademark Office  
Address: COMMISSIONER FOR PATENTS  
P.O. Box 1450  
Alexandria, Virginia 22313-1450  
www.uspto.gov

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/595,333	01/26/2007	Yiquan Yang	032301.452	7657
25461 7590 11/23/2007 SMITH, GAMBRELL & RUSSELL SUITE 3100, PROMENADE II 1230 PEACHTREE STREET, N.E. ATLANTA, GA 30309-3592			EXAMINER LAO, MARIALOUISA	
			ART UNIT 1621	PAPER NUMBER
			MAIL DATE 11/23/2007	DELIVERY MODE PAPER

**Please find below and/or attached an Office communication concerning this application or proceeding.**

The time period for reply, if any, is set in the attached communication.

**Office Action Summary**

Application No.

10/595,333

Applicant(s)

YANG ET AL.

Examiner

M. Louisa Lao

Art Unit

1621

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

**Period for Reply**

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

**Status**

- 1) ☐ Responsive to communication(s) filed on \_\_\_\_.
- 2a) ☐ This action is FINAL. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

**Disposition of Claims**

- 4) ☒ Claim(s) 1-40 is/are pending in the application.
- 4a) Of the above claim(s) 33-40 is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1-40 is/are rejected.
- 7) ☒ Claim(s) 10,12 is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_ are subject to restriction and/or election requirement.

**Application Papers**

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on \_\_\_\_ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

**Priority under 35 U.S.C. § 119**

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some \* c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- \* See the attached detailed Office action for a list of the certified copies not received.

**Attachment(s)**

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☒ Information Disclosure Statement(s) (PTO/SB/08)  
Paper No(s)/Mail Date 04/10/200606/28/2007.
- 4) ☐ Interview Summary (PTO-413)  
Paper No(s)/Mail Date. \_\_\_\_.
- 5) ☐ Notice of Informal Patent Application
- 6) ☐ Other: \_\_\_\_.

## **DETAILED ACTION**

### ***Election/Restrictions***

1. Applicant's election without traverse of Group I (claims 1-32) in the reply filed on 9/27/07 is acknowledged.
2. Claims 33-40 are withdrawn from further consideration pursuant to 37 CFR 1.142(b) as being drawn to a nonelected invention, there being no allowable generic or linking claim. Election was made **without** traverse in the reply filed on 9/27/07.

### ***Claim Objections***

3. Claims 10 and 12 are objected to because of the following informalities: in line 3, claim 10 recites 10.000 per hour, and in line 12, claim 12 recites 1,5%; where Applicants may have intended to recite 10,000 per hour and 1.5%, respectively. Appropriate correction is required. Further, Applicants are respectfully requested to check the specification for grammatical and typographical errors.
4. Applicant is advised that should claims 7-8 be found allowable, claims 29, 30 and 32 will be objected to under 37 CFR 1.75 as being a substantial duplicate thereof. When two claims in an application are duplicates or else are so close in content that they both cover the same thing, despite a slight difference in wording, it is proper after allowing one claim to object to the other as being a substantial duplicate of the allowed claim. See MPEP § 706.03(k).

### ***Claim Rejections - 35 USC § 112***

5. The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter, which the applicant regards as his invention.

Art Unit: 1621

6. Claim 6 is rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention. In line 1, claim 6 recites "the active catalyst mass", there is insufficient antecedent basis for this limitation. Applicants may have intended to recite said preformed solid catalyst.

7. Claims 22 and 23 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention. In lines 2, claim 12 and claim 23 recite the limitation "the total gas hourly". There is insufficient antecedent basis for this limitation in the claim.

8. Claim 26 is rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention. In line 3, claim 26 recites "the reacting gases". There is insufficient antecedent basis for this limitation in the claim.

9. Claims 9 and 31 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention. Claim 9 recites that by-products are methane, dimethylsulfide and carbon disulfide; while claim 31 recites that main by-products are carbonyl sulfide, carbonyl disulfide and/or dimethylsulfide. It is unclear if these compounds are all considered by-products.

10. Claim 31 is rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention. In line 1, claim 31 recites "the main by-products". There is insufficient antecedent basis for this limitation in the claim.

***Claim Rejections - 35 USC § 103***

Art Unit: 1621

11. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

12. The factual inquiries set forth in *Graham v. John Deere Co.*, 383 U.S. 1, 148 USPQ 459 (1966), that are applied for establishing a background for determining obviousness under 35 U.S.C. 103(a) are summarized as follows:

1. Determining the scope and contents of the prior art.
2. Ascertaining the differences between the prior art and the claims at issue.
3. Resolving the level of ordinary skill in the pertinent art.
4. Considering objective evidence present in the application indicating obviousness or nonobviousness.

13. This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

14. Claims 1-32 are rejected under 35 U.S.C. 103(a) as being unpatentable over Yang et al. Catalysis Letters (2201), 74(3-4), 221-225 in view of Eastman et al. (US4389304, US'304) and Folkins et al. (US2976322, US'322).

15. The instant claims are drawn to a continuous process for the manufacture of methylmercaptan comprising *inter alia* contacting in a reaction a mixture of carbon oxides,

Art Unit: 1621

sulfur or hydrogen sulfide and hydrogen in the presence of a catalyst comprising an active component of Mo-O-K-based species (oxides of molybdenum), an active promoter (mixture of oxides or sulfides or sulfides and oxides) and, optionally, a carrier (silica). The by-products are separated from the unused reactants; where the both are catalytically converted, prior to re-use, to carbon oxides hydrogen and hydrogen sulfide.

16. Yang et al. teach the catalytic reaction for methanethiol synthesis in the presence of prepared catalysts (section 2.1 page 221),  $K_2MoO_4/SiO_2$  and  $MoO_3/K_2CO_3/SiO_2$  (from  $(NH_4)_6Mo_7O_{24} \cdot 4H_2O$ ) from high  $H_2S$ -containing syngas at reaction conditions of  $295^\circ C$ ,  $GHSV=3000h^{-1}$ ,  $V(CO):V(H_2):V(H_2S)=2:7:1$  and reaction products are hydrocarbon and mercaptan (page 221 column 2). Yang et al. teaches in Tables 1 and 2, the results of the methanethiol synthesis with the selectivities to be as high as 99%. Yang et al. teaches that  $MoO_3/K_2CO_3/SiO_2$  (5/3/20) has a high catalytic activity (column 1 page 224).

17. Yang et al. differs from the instant claims in that Yang et al. does not explicitly teach that the catalyst has a promoter, that the catalyst is extruded or pelletized to a 3-dimensional form, that the unreacted materials are separated from the by-products, whereupon the both, after catalytically being converted, are re-used, that the catalysts may be arranged in fixed beds and that the recitation of by-products.

18. US'322, however, is relied upon to teach that a promoter, at the time of Applicants' invention, is employed to enhance the catalytic properties of the catalyst (column 2 line 68).

19. US'304, on the other hand, is relied upon to teach the hydrodesulfurization of organic compounds in the presence of catalyst compositions comprising *inter alia* molybdenum (see abstract).

Art Unit: 1621

20. At the time of Applicants' invention, one of ordinary skill in the art looking for a methylmercaptan synthesis, would have found it obvious to start with the teachings of Yang et al. Yang et al. teaches the methanethiol synthesis in the presence of catalysts as the instant process.

21. The artisan would have been motivated to utilize the method of hydrodesulfurization of organic compounds taught by US'304, use promoters as taught by US'322 with the methanethiol synthesis of Yang et al. for optimization of the process and save on raw material costs and expect a reasonable expectation of producing methanethiol from a bench to a large-scale process, optimizing the steps thereto.

22. The form of the catalyst as pellets or extrudates and the recycling of unused materials are optimization techniques that are within the purview of the artisan in his normal endeavor, without inordinate degree of experimentation, absent showing of unexpected results.

Optimizing such processes is *prima facie* obvious because an ordinary artisan would be motivated to use known processes from the art to make the process more efficient or explore economical advantages over the other. Merely modifying the process conditions is not a patentable modification absent a showing of criticality. In re Aller, 220 F.2d 454, 105 U.S.P.Q. 233 (C.C.P.A. 1955).

The claim would have been obvious because " a person of ordinary skill has a good reason to pursue the known options within his or her technical grasp. If this leads to the anticipated success, it is likely the product, not of innovation, but of ordinary skill and common sense.

23. No claims are allowed.

### *Correspondence*

Any inquiry concerning this communication or earlier communications from the examiner should be directed to MLouisa Lao whose telephone number is 571-272-9930. The examiner can normally be reached on Mondays to Thursdays from 8:00am to 8:00pm. If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Yvonne Eyler can be reached on 571-272-0871. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300. Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

Art Unit: 1621

`mll

MLouisa Lao

Examiner

Art Unit 1621

*Fortino Vazquez Gonzalez*  
for YVONNE EYLER  
SUPERVISORY PATENT EXAMINER  
TC1600 GAU 1621